

AMENDMENT UNDER 37 C.F.R. § 1.111  
U.S. Application No.: 10/617,204  
Attorney Docket No.: Q76412

**REMARKS**

Upon entry of the present Amendment, claims 1-9 are all the claims pending in the application. Claims 1, 4 and 8 are amended. No new matter is presented.

Applicant thanks the Examiner for considering the documents submitted in the IDS filed on July 11, 2003.

The Examiner is kindly requested to acknowledge acceptance of the drawings filed on July 11, 2003.

To summarize the Office Action, claims 1-9 have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite, claims 4 and 8 have been rejected under 35 U.S.C. § 101 as allegedly being directed to non-statutory subject matter, and claims 1-6 and 8 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Gnauck et al. (U.S. Patent No. 5,400,165, hereinafter “Gnauck”). Claim 7 is objected to as being dependent from a rejected base claim, but would be allowable if rewritten in independent form.

The outstanding rejections and objection are traversed, as addressed below.

**Claim Rejections 35 U.S.C. § 112**

In rejecting claims 1, 4 and 8, the Examiner apparently contends that the recitation “said fiber operates in a non-linear transmission regime to improve transmission characteristics” is

AMENDMENT UNDER 37 C.F.R. § 1.111  
U.S. Application No.: 10/617,204  
Attorney Docket No.: Q76412

indefinite because “it is unclear how the fiber performs such function.” *See* Office Action at page 2.

Applicant notes that the present application describes a “non-linear effect” in the context of transmission of an optical signal at, for example, page 6 of the specification. Without conceding that the recitation identified by the Examiner is indefinite, Applicant notes that claims 1, 4 and 8 have been amended to provide additional clarity by reciting, *inter alia*, a non-linear transmission effect occurs in the transmission of the modulated optical signal by the optical fiber, which is fully supported at least by the exemplary discussion noted above. Reconsideration and withdrawal of this ground of rejection is therefore requested.

With respect to claims 4 and 8, the Examiner contends that the claims are indefinite because the use of frequency shift keying modulation is provided without setting forth “any steps involved in the method/process.” *See* Office Action at page 2. Applicant notes, however, that claim 4 defines an optical transmission system and recites the feature of an optical transmitter configured to launch the modulated optical signal into the optical fiber with an optical power set such that a non-linear transmission effect occurs in the transmission of the modulated optical signal by the optical fiber, in which the digital signal is modulated using FSK modulation. Claim 8 defines an optical transmitter and recites analogous features to those mentioned above with respect to claim 4. Thus, Applicant submits that the features of the apparatus defined by claims 4 and 8 are sufficiently clear and definite, and reconsideration and withdrawal of this ground of rejection is requested.

AMENDMENT UNDER 37 C.F.R. § 1.111  
U.S. Application No.: 10/617,204  
Attorney Docket No.: Q76412

### **Claim rejections 35 U.S.C. § 101**

For reasons analogous to those discussed above with respect the 35 U.S.C. § 112, second paragraph, rejection of claims 4 and 8, Applicant submits that claims 4 and 8 properly define an optical transmission system and an optical transmitter, and are therefore statutory subject matter within 35 U.S.C. § 101. Reconsideration and withdrawal of this ground of rejection is requested.

### **Claim rejections 35 U.S.C. § 102**

As noted above, claims 1-6 and 8 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Gnauck. Applicant traverses and submits that Gnauck fails to disclose or suggest all of the claim limitations, as evidenced by the following.

For instance, Gnauck fails to disclose or suggest at least the following features of the method of transmitting a digital signal defined by claim 1, which recites, *inter alia*, the frequency shift keying modulation, which modulates the digital signal onto the optical carrier, has a modulation index  **$h < 1/2$** , and an optical power of the modulated optical signal **launched** into the optical fiber is such that a **non-linear transmission effect occurs in the transmission of the modulated optical signal by the optical fiber**

Conversely, Gnauck discloses utilizing a “minimum shift key (MSK) modulation at 10 Gbits/sec. Although a modulation index of about 0.5 was used, higher or lower modulation

AMENDMENT UNDER 37 C.F.R. § 1.111  
U.S. Application No.: 10/617,204  
Attorney Docket No.: Q76412

indices were also **simulated** and resulted in no significant improvement in performance". (col. 9, lines 41-46) Thus, Gnauck fails to disclose **frequency shift keying modulation**, wherein said frequency shift keying modulation has a **modulation index  $h < 1/2$** , in the method of claim 1.

Moreover, Applicant note that Gnauck discloses use of computer simulated performance to arrive at the results shown in Fig. 5. However, Gnauck's results are based on an MSK modulation at a modulation index equal to 0.5 (Fig. 5 and col. 12, lines 10-13). Thus, the Gnauck only recites validating computationally. One skilled in the art would consider validating modulating with indices less than 0.5 to encompass some sort of experimental laboratory work that is not supported in the Gnauck's specification. Gnauck discloses simulating indices of about 0.5 and also displays computer simulated results in Fig. 5 with indices **equal to 0.5** but clearly does not disclose using indices less than 0.5 with experimental results based on actual conditions (col. 9, line 43-44 and col. 12, lines 10-13).

Furthermore, Gnauck discloses a "second distinct operating region is the portion of the fiber span between dotted lines 1 and 2. This region is characterized by increasing importance of the nonlinear effects as a result of increasing accumulated dispersion within the fiber. Within this region the Kerr effect must be taken into account" (col. 6, lines 40-45; and FIG. 1(b)). Gnauck further notes that "Within this region nonlinear effects may be **controlled** by adjusting amplifier spacing  $\Delta L$  and output power" (col. 6, lines 51-53). Thus, Gnauck not only teaches away from the invention, as claimed, but fails to disclose the feature of a frequency shift keying modulation [having] a modulation index  $h < 1/2$ , **and** optical power of said digital signal **launched** into the

AMENDMENT UNDER 37 C.F.R. § 1.111  
U.S. Application No.: 10/617,204  
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optical fiber is such that a non-linear transmission effect **occurs** in the transmission of the digital signal by the optical fiber.

In contrast, in accordance with the present invention, as defined by method claim 1, a modulation index of  $h < 0.5$  in conjunction with non-linear distortion effects during transmission results in increased sensitivity. Non-linear transmission is achieved by increasing the transmission power injected into the fiber above a level at which non-linear effects (e.g., the Kerr effect) becomes predominant. *See, e.g.*, Specification at page 6.

Therefore, at least for the above reasons, Applicant respectfully submits that claim 1 is allowable because Gnauck fails to disclose all the claimed features of the method. Withdrawal of the rejection is requested.

Further, Applicant respectfully submits that rejected claims 2-3, are allowable, at least because of their dependency and by virtue of the features recited therein.

Apparatus claims 4 and 8 recite features analogous to the features recited in claim 1 which are likewise not disclosed by Gnauck. Reconsideration and withdrawal of the rejection of these claims is requested.

Furthermore, Applicant submits that rejected claims 5-7 and 9 are allowable, at least because of their respective dependency and by virtue of the features recited therein.

AMENDMENT UNDER 37 C.F.R. § 1.111  
U.S. Application No.: 10/617,204  
Attorney Docket No.: Q76412

**Conclusion**

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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